

Project Title: Evaluation of Reactive Barrier Technology for Remediation of Nutrient-Contaminated Ground Water from a Swine CAFO

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Long-Term Goal/APM: (1) WQ MYP - Long-Term Goal TBD/APM TBD, (2) HW MYP - Long-Term Goal TBD/APM TBD

Abstract: The overall goals of research tasks described here are to better understand the chemical and microbiological processes that result in nitrate removal in carbon-based permeable reactive barriers (PRBs) and to evaluate the effect of the PRB on downgradient aquifer/ground-water chemistry. This work will be conducted at a now-closed facility in Oklahoma. This facility had originally been a swine CAFO, and led to extensive on-site ground water contamination by both nitrate and ammonium through approximately seven years of operation. The selected remediation strategy has been to install an interception trench barrier for recovery and subsequent above-ground treatment of ammonium, and a permeable reactive barrier (PRB) with commercial hay as the reactive matrix for in-situ treatment of nitrate. GWERD personnel have been invited to help evaluate the current remediation strategy. Additional site characterization will be required to better assess PRB performance, and GWERD personnel will use this information to better assess system performance and address problems which arise. The objectives of proposed research activities are to develop a hydrogeological conceptual model for the site and also to develop monitoring approaches that can be used to better predict the performance and longevity of carbon-based reactive barriers for nitrate removal. The proposed research is organized into three principal topical areas: (1) Development of a site hydrogeological model, (2) Detailed ground water characterization in regions of the site upgradient, downgradient, and within the reactive treatment zone, and (3) Microbiological and geochemical characterization of the carbon-based PRB.

Status: This task will be funded with both Water Quality and Hazardous Waste funds. Ground water characterization has been completed for all existing wells currently on the site as part of a separate project (GWERD Task 5823), and plans are to install monitoring wells in the immediate PRB once other logistic arrangements have been finalized.

Products: (1) Paper on general site characterization and initial PRB performance (*planned*); (2) paper on ground water modeling and PRB performance (*planned*), (3) paper on development of geomicrobiological reaction transport model for assessing PRB performance (*planned*).